What is Claimed is:

1. A perpendicular magnetic recording medium comprising:

a nonmagnetic substrate and

a magnetic layer having a multilayered lamination structure of alternately laminated cobalt layers containing mainly cobalt and noble metal layers of platinum or palladium,

wherein at least one of the cobalt layers and the noble metal layers contains at least one element selected from the group consisting of Ru, Ta, Nb, Mo, Mn, Cr, Si, and Ni, or at least one oxide.

2. A perpendicular magnetic recording medium according to claim 1, wherein the content of at least one element or one oxide ranges from 1 to 15 at%.

3. A perpendicular magnetic recording medium according to claim 2, wherein the cobalt layers contain silicon oxide ranging from 5 to 11 mol%, and the noble metal layers are composed of platinum and contains silicon oxide ranging from 1 to 8 mol%.

4. A perpendicular magnetic recording medium according to claim 1, wherein each of the cobalt layers has a thickness ranging from 0.2 to 0.8 nm and each of the noble metal layers has a thickness ranging from 0.05 to 1.2 nm.

5. A perpendicular magnetic recording medium according to claim 1, further including an underlayer between the magnetic layer and the substrate, the magnetic layer being formed directly on the underlayer.

6. A perpendicular magnetic recording medium according to claim 5, wherein the underlayer is composed of a platinum film, a palladium film, a ruthenium film, or a laminated structure of platinum and palladium films.

7. A perpendicular magnetic recording medium according to claim 5, wherein the thickness of the underlayer ranges from 1 to 20 nm.

8. A perpendicular magnetic recording medium according to claim 5, further including an orientation control layer between the substrate and the underlayer for controlling crystalline orientation of the underlayer.

9. A perpendicular magnetic recording medium according to claim 8, wherein the orientation control layer is composed of a lamination of a first seed layer and a second seed layer, and a composition of the second seed layer is selected so as to orient the underlayer in a c-crystal axis.

10. A perpendicular magnetic recording medium according to claim 9, wherein the first seed layer is composed of a tantalum layer and the second seed layer is composed of a layer selected from a NiFeCr layer, a NiFeNbB layer, and a NiFeSi layer.

11. A perpendicular magnetic recording medium according to claim 9, wherein the thickness of the first seed layer ranges from 1 to 10 nm, and the thickness of the second seed layer ranges from 5 to 20 nm.

12. A perpendicular magnetic recording medium according to claim 9, further including a soft magnetic backing layer between the substrate and the first seed layer.

13. A perpendicular magnetic recording medium according to claim 12, wherein the backing layer is composed of a CoZrNb alloy or a CoZrTa alloy having a thickness ranging from 50 to 400 nm.

14. A method of manufacturing a perpendicular magnetic recording medium comprising the steps of:

providing a nonmagnetic substrate; and

depositing, on the nonmagnetic substrate, a magnetic layer having a multilayered lamination structure by alternately laminating cobalt layers mainly containing cobalt and noble

metal layers of platinum or palladium, using a target containing at least one element selected from the group consisting of Ru, Ta, Nb, Mo, Mn, Cr, Si, and Ni, or at least one oxide.

15. A method of manufacturing a perpendicular magnetic recording medium according to claim 14, wherein the content of at least one element or one oxide ranges from 1 to 15 at%.

16. A method for manufacturing a perpendicular magnetic recording medium according to claim 14, wherein the magnetic layer is deposited with a sputtering gas containing oxygen ranging from 0.05 to 0.5 % in a relative mass flow rate.

17. A method for manufacturing a perpendicular magnetic recording medium according to claim 14, further comprising the step of depositing an underlayer composed of a film selected from a platinum film, a palladium film, a ruthenium film, or a platinum and palladium lamination film, on the substrate before depositing the magnetic layer.

18. A method for manufacturing a perpendicular magnetic recording medium according to claim 17, wherein the underlayer and the magnetic layer are deposited using a sputtering gas selected from krypton, xenon, a mixture of krypton and argon, and a mixture of xenon and argon.

19. A method for manufacturing a perpendicular magnetic recording medium according to claim 17, further comprising the step of adsorpting oxygen on the underlayer surface after depositing the underlayer and before depositing the magnetic layer, the adsorption step including exposing the surface of the underlayer to argon gas containing 1 to 10 % of oxygen in relative mass flow rate under a pressure ranging from 0.1 to10 Pa for 1 to 20 seconds.